PCT WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 5 :		(11) International Publication Number:	WO 90/05050
B27F 1/00, B27C 1/12	A1	(43) International Publication Date:	17 May 1990 (17.05.90)

(21) International Application Number: PCT/FI89/00202

(22) International Filing Date: 3 November 1989 (03.11.89)

(30) Priority data:
885119 7 November 1988 (07.11.88) FI

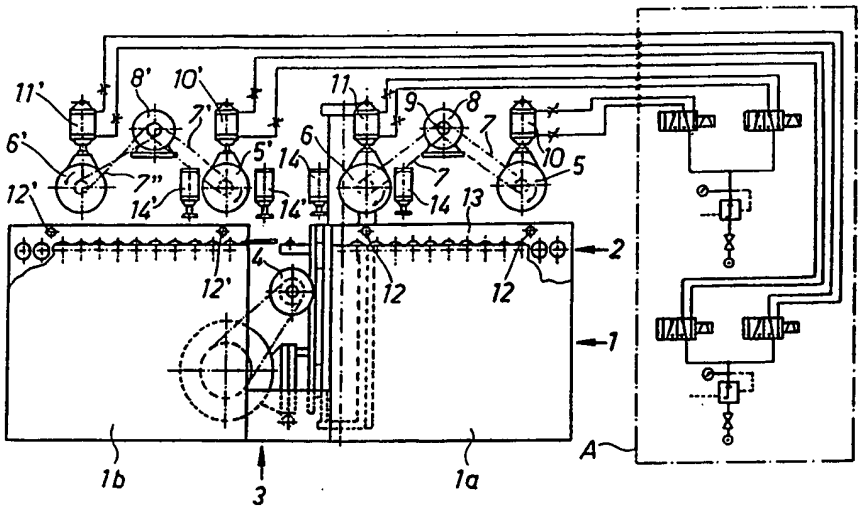
(71)(72) Applicant and Inventor: VUOLLE-APIALA, Antti [FI/FI]; Alatie 16 A 10, SF-42300 Jämsänkoski (FI).

(74) Agent: LEITZINGER OY; Ruoholahdenkatu 8, SF-00180 Helsinki (FI).

(81) Designated States: AT (European patent), BE (European patent), CH (European patent), DE (European patent), DK, FR (European patent), GB (European patent), IT (European patent), LU (European patent), NL (European patent), NO, SE (European patent).

Published
With international search report.
In English translation (filed in Finnish).

(54) Title: FEEDING APPARATUS



(57) Abstract

The invention relates to a feeding apparatus for advancing pieces against a fixed stopper, particularly a feeding apparatus for supplying a milling mechanism (3) with pieces to be spliced on a timber splicing line, said feeding apparatus comprising one or a plurality of rotatable rolls (5, 6, 5', 6') for advancing a piece to be worked. The roll or rolls (5, 6, 5', 6') are driven continuously. Each roll is provided with a power unit (10, 11, 10', 11') for carrying the roll towards or away from a piece to be worked.

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AT	Austria	ES	Spain	MG	Madagascar
AU	Australia	FI	Finland	ML	Mali
BB	Barbados	FR	France	MR	Mauritania
BE	Belgium	GA	Gabon	MW	Malawi
BF	Burkina Fasso	GB	United Kingdom	NL	Netherlands
BG	Bulgaria	HU	Hungary	NO	Norway
BJ	Benin	IT	Italy	RO	Romania
BR	Brazil	JP	Japan	SD	Sudan
CA	Canada	KP	Democratic People's Republic of Korea	SE	Sweden
CF	Central African Republic			SN	Senegal
CG	Congo	KR	Republic of Korea	SU	Soviet Union
CH	Switzerland	LI	Liechtenstein	TD	Chad
CM	Cameroon	LK	Sri Lanka	TG	Togo
DE	Germany, Federal Republic of	LU	Luxembourg	US	United States of America
DK	Denmark	MC	Monaco		

Feeding apparatus

The present invention relates to a feeding apparatus for advancing pieces against a fixed stopper, particularly a feeding apparatus for advancing pieces to be spliced on a timber splicing line to a milling mechanism, said feeding apparatus comprising one or a plurality of rotatable rolls for feeding or advancing the piece to be handled.

In this type of prior known splicing line feeding equipment, the feeding elements comprise rubber-coated rolls which are rotated by means of brake motors. Thus, the movements of pieces to be advanced are acacomplished by alternately starting and shutting down a brake motor. On the one hand, this type of line is relatively expensive and, on the other, the splicing of rather short pieces thereby is not economically feasible due to the slow line speed.

An object of the invention is to provide an economically feasible feeding apparatus which can be profitably operated also in connection with short pieces.

According to the invention, this object has been resolved in a manner that a roll or rolls are driven continuously, and that for each roll there is a power unit for carrying the roll towards or away from a piece to be handled.

In addition, the invention provides such an arrangement that the power unit of each roll is controlled independently. The power unit is preferably a pneumatic cylinder for providing an extremely short reaction time. A pneumatic cylinder can also be controlled

readily and accurately by means of per se known equipment. If major forces are involved, it is also possible to use a hydraulic cylinder. The power unit can simultaneously move one or a plurality of rolls according to the position of the power unit for directing a divergent force through the action of the roll to a piece being handled.

According to the invention, the roll is driven by an electric or hydraulic motor, preferably at a constant speed of rotation, each motor preferably also rotating at least two rolls at the same time. For varying the feeding rate, the rolls can be arranged to have unequal diameters.

The invention will now be described in more detail and by way of an example with reference made to the accompanying drawings, in which:

fig. 1 shows a schematic side view of a feeding apparatus of the invention in a first embodiment.

Figs. 2 and 3 are schematic side views of a feeding apparatus of the invention in a second and a third embodiment.

A feeding apparatus shown in fig. 1 is intended for supplying a milling mechanism with pieces to be spliced on a timber splicing line.

Reference numeral 1 indicates a body portion, the upper portion thereof being provided with a set of conveyor rollers 2 for carrying pieces (not shown) to be handled. The body portion 1 comprises two sections and between its sections 1a and 1b is fitted a vertically recipro-

cating milling mechanism 3 provided with a cutter blade 4 for cutting the necessary splice joint profiles in both ends of the pieces. The pieces to be worked are carried across the body portion from right to left in fig. 1.

Above the set of conveyor rollers 2 at body section 1a there are two rolls 5, 6 having a smooth steel surface, both rotated through the action of e.g. belts or chains 7 by an electric or hydraulic motor 8. Rolls 5, 6 are journalled pivotably relative to the centre axis 9 of motor 8, said roll 5 being provided with a power unit 10 and roll 6 with a power unit 11 for carrying rolls 5, 6 towards or away from set of rollers 2 or a piece to be worked for initiating or stopping a feeding cycle, respectively.

Rolls 5, 6 are driven continuously and usually at a constant speed of rotation. Power units 10, 11, which are preferably pneumatic cylinders, are used for bringing rolls 5, 6 together or separately into or respectively out of contact with a piece to be worked.

It should particularly be noted that roll 5, 6 can be shifted by means of power unit 10, 11 in a stepless manner relative to a piece to be worked for thus affecting the friction force between the roll and the piece.

Reference numeral 12 indicates lateral buffers, whereby a piece pushed by rolls 5, 6 against a stopper (not shown) aligned with cutter blade 4 can be shifted against a lateral stopper 13, whereafter overhead rams 4 immobilize the piece for the duration of the end working effected by milling machine 3.

Above the set of conveyor rollers 2 at body section 1b there are substantially all the same elements and the same construction as those at body section 1a, the equivalent components being indicated with the same reference numerals, however, with an inverted comma added to those at body section 1b. The most significant difference is that the rotating direction of roll 6' (the left-hand roll in fig. 1) is reversed e.g. by means of a crossed belt or a gear 7" relative to that of other rolls 5, 6 and 5'. In addition, between rolls 5' and 6' is fitted e.g. a photoelectric cell (not shown) for detecting a passing piece.

Power units 10, 11, 10', 11' are controlled by means of an apparatus indicated by reference A, whose construction need not be described in this context as it can be considered completely prior known.

The operation of a feeding apparatus used on a timber splicing line proceeds as follows.

A piece to be worked is brought into the feeding apparatus from the right in fig. 1. The piece may reach the region of roll 5 at a speed higher than the peripheral speed of roll 5, whereby there is skidding between roll and piece until the speed of a piece has decelerated to match the peripheral speed of roll 5. The relative skidding between a piece and roll 5 can be arranged by means of the adjustment of power unit 10 in such a manner that, when the question is about heavy pieces, the skidding does not stop until roll 6 engages the piece. With light pieces the skidding can come to a virtually immediate stop.

Slowing down the traveling speed of a piece can also be effected in a manner that initially roll 5 reduces the speed of a piece to match its own peripheral speed. Then roll 6, which can be smaller in diameter or which can be driven at a lower speed of rotation, reduces further the speed of a piece.

The purpose of slowing down the speed of a piece is to prevent the end of a piece from damaging upon its impact against the stopper.

Upon the impact of a piece against the stopper, or possibly slightly prior to that, roll 5 is hoisted up or at least the pressure applied thereby to a piece is relieved. Following the impact, the piece may bounce slightly backwards from the stopper and this is corrected by allowing roll 6 and/or 5 to rotate for a certain period of time for pressing the piece tightly against the stopper. Also the compressive force of the roll can be slightly reduced at the same time. By virtue of their smooth steel surface, the rolls do not inflict serious surface defects on the pieces to be worked even if there were some relative skidding between roll and piece.

After bringing the piece tightly against the stopper and, possibly, roll 6 and/or 5 also applying a light pressure upon the piece, lateral buffers 12 force the piece against a lateral stopper 13 whereafter overhead rams 14 immobilize the piece for the duration of working of the end of a piece effected by milling mechanism 3.

After the working is completed, the stopper descends, overhead rams 14 and lateral buffers 12 release their

grip and rolls 5, 6 and 5' are depressed, the piece advancing from right to left in fig. 1 until a photo-electric cell between rolls 5' and 6' confirms that the piece has passed this particular point. Thus, roll 6' descends, stops the piece and feeds it in the opposite direction, from left to right in fig. 1, towards a second stopper jutting out at milling mechanism 3.

The feeding motion applied by roll 6' to a piece can be decelerated by adjusting power unit 10' of roll 5' in a manner that roll 5' applies a light pressure against a piece and thus produces an oppositely directed force.

After a piece has pushed itself to the stopper, roll 5' is hoisted completely off while roll 6' continues, possibly in relieved condition, compressing the piece against the stopper in order to eliminate possible bouncing.

This is followed by immobilizing the piece by means of lateral buffers 12' and overhead rams 14' and working of the end is effected by milling mechanism 3.

After this, the lateral buffers 12' and overhead rams 14' release the piece, roll 5' is descended for feeding the piece from right to left in fig. 1 to the next operation.

The second embodiment of a feeding apparatus illustrated in fig. 2 differs from that of fig. 1 in the roll arrangements mounted downstream of milling mechanism 3 in the through-put direction of a splicing line, in other words within the region of body section 1b.

In fig. 2, a left-hand roll 5" rotates in the same direction as roll 5'. Between rolls 5' and 5" is fitted a roll 15 which is driven by roll 5' through the action of a crossed belt 16 in the opposite direction relative to rolls 5' and 5". A power unit 17 for roll 15 is mounted below the set of rollers 2. In fig. 2, the operation of roll 15 corresponds to the action of roll 6' in fig. 1. Roll 5" serves as an extra feeding roll.

Fig. 3 illustrates a third embodiment of the feeding apparatus which differs from that of fig. 2 in that roll 15 is replaced with a roll 18. In its descended position, roll 18 is entirely below the top level of set of rollers 2. Rolls 5" and 18 are connected together in a manner that a power unit 11" moves both rolls simultaneously. Roll 5" drives through the action of an array or a chain 19 a roll 18. When power unit 11' is used to hoist up the rolls 15" and 18, the piece is pressed against rollers 20 and roll 18 carries the pice towards right in fig. 3.

Claims

1. A feeding apparatus for advancing pieces, arriving in the feeding apparatus at varying speeds and having different weights, in a controlled manner against a fixed stopper, particularly a feeding apparatus for supplying a milling mechanism (3) with pieces to be spliced on a timber splicing line, said feeding apparatus comprising one or a plurality of rotatable rolls (5, 6, 5', 6', 5", 15, 18) for advancing a piece to be worked, each roll being provided with a power unit (10, 11, 10', 11') for carrying the roll towards or away from a piece to worked, c h a r a c t e r i z e d in that said roll or rolls (5, 6, 5', 6', 5", 15, 18) are driven continuously, that the power unit (10, 11, 10', 11') of each roll (5, 6, 5', 6', 5", 15, 18) is independently controlled, and that said roll (5, 6, 5', 6', 5", 15, 18) is a smooth-surfaced roll, preferably of steel.

2. A feeding apparatus as set forth in claim 1, c h a r a c t e r i z e d in that a power unit (11') has two rolls (5", 18) connected thereto which direct their effects on different sides of a supplied piece for producing feeding actions in different directions.

3. A feeding apparatus as set forth in claim 1 or 2, c h a r a c t e r i z e d in that the power unit (10, 11, 10', 11') is a pneumatic cylinder or a hydraulic cylinder.

4. A feeding apparatus as set forth in any of claims 1 - 3, c h a r a c t e r i z e d in that said roll (5, 6, 5', 6', 5", 15, 18) is driven at a constant speed of rotation.

5. A feeding apparatus as set forth in any of claims 1 - 4, c h a r a c t e r i z e d in that said roll (5, 6, 5', 6', 5", 15, 18) is driven by an electric or hydraulic motor, and that said motor drives simultaneously at least two rolls.

6. A feeding apparatus as set forth in any of claims 1 - 5, c h a r a c t e r i z e d in that said rolls (5, 6, 5', 6', 5", 15, 18) are of equal size in diameter.

7. A feeding apparatus as set forth in any of claims 1 - 5, c h a r a c t e r i z e d in that said rolls (5, 6, 5', 6', 5", 15, 18) are of unequal size in diameter.

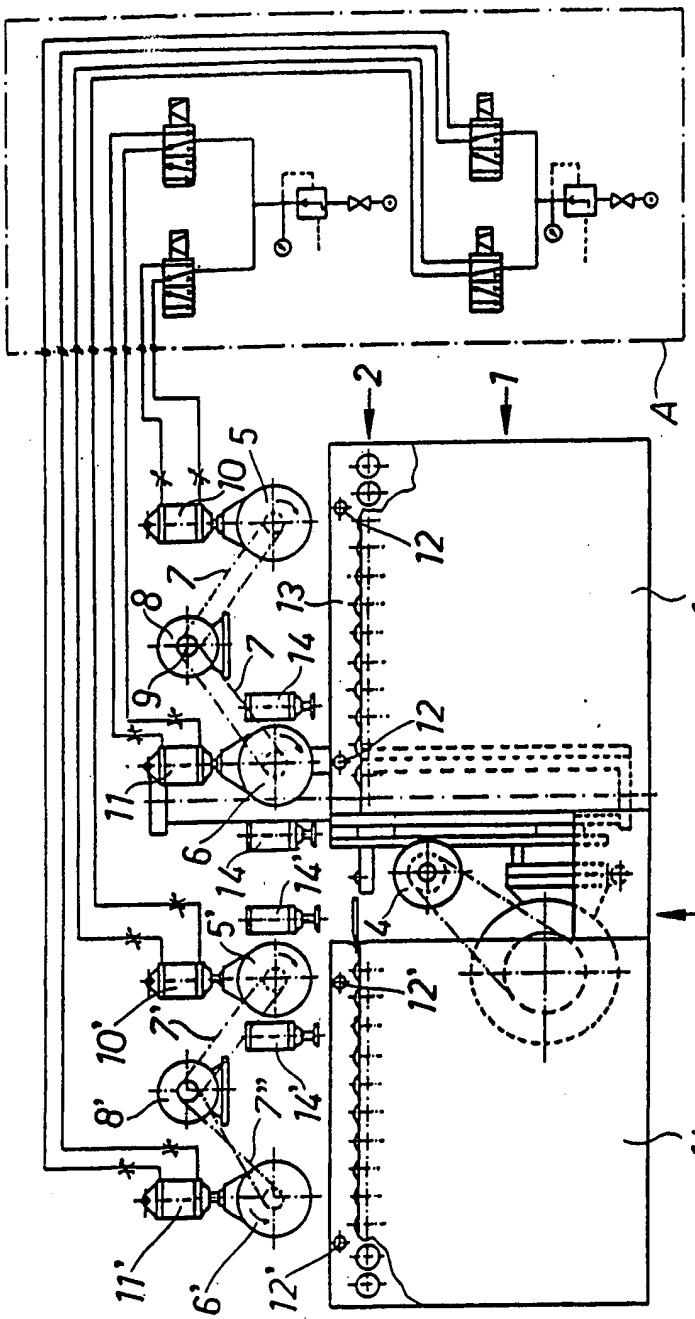


Fig. 1

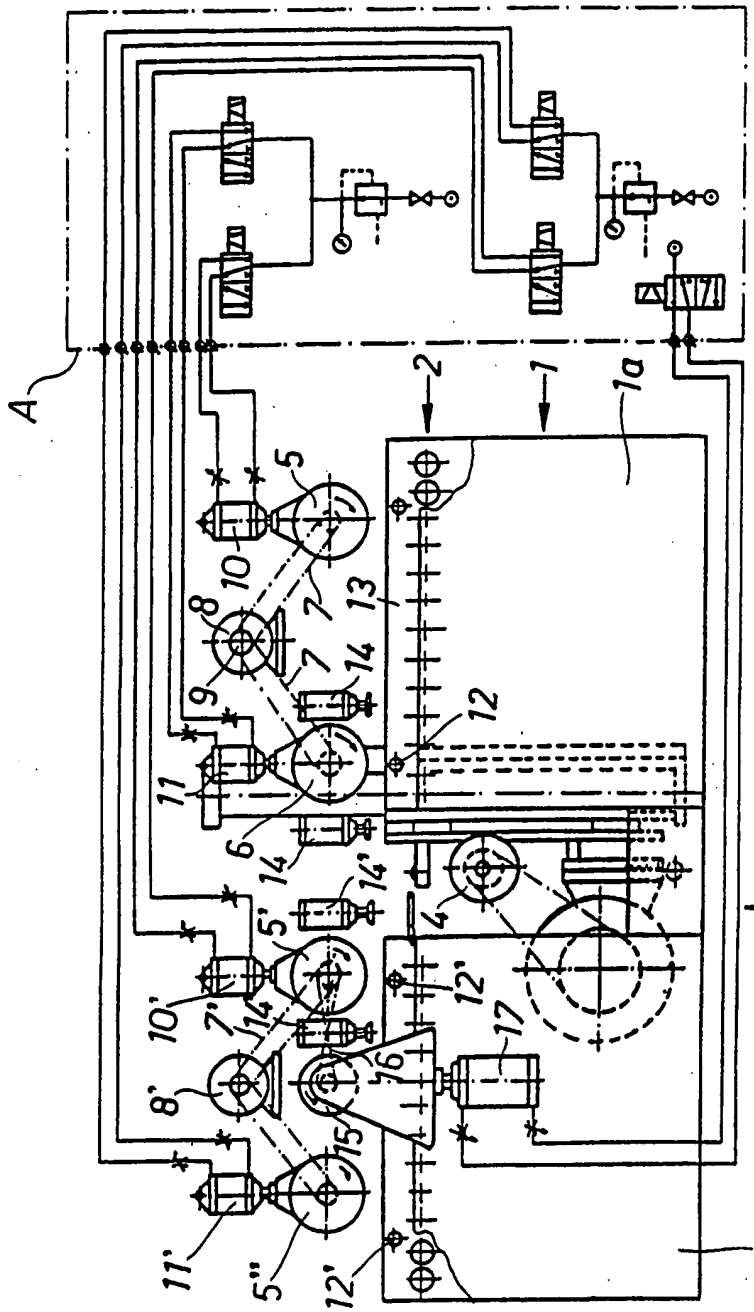


Fig. 2

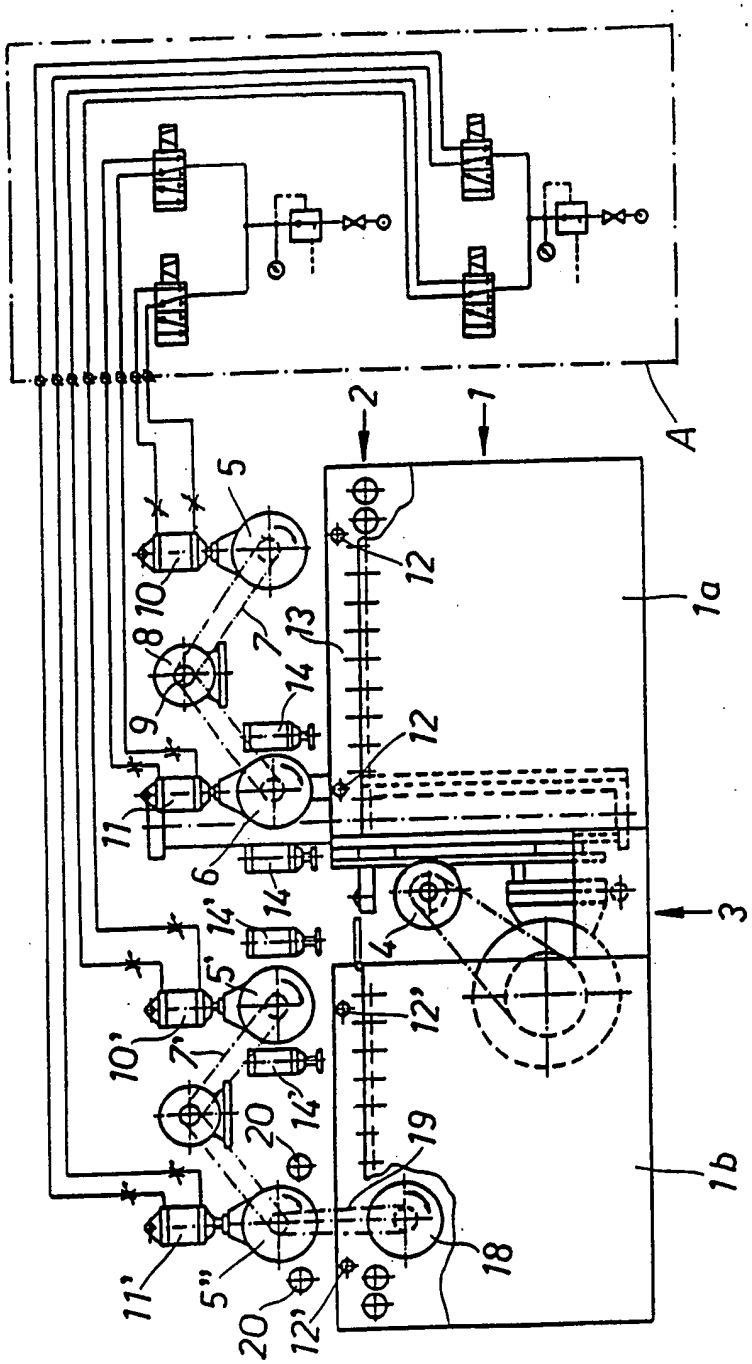


Fig.3

INTERNATIONAL SEARCH REPORT

International Application No PCT/FI 89/00202

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) [6]

According to International Patent Classification (IPC) or to both National Classification and IPC

IPC5: B 27 F 1/00, B 27 C 1/12

II. FIELDS SEARCHED

Minimum Documentation Searched [7]

Classification System	Classification Symbols
IPC5	B 27 F; B 27 C; B 65 G; B 27 B; B 23 Q

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched [8]

SE,DK,FI,NO classes as above

III. DOCUMENTS CONSIDERED TO BE RELEVANT [9]

Category [10]	Citation of Document, [11] with indication, where appropriate, of the relevant passages [12]	Relevant to Claim No. [13]
X	SE, B, 392831 (AB IGGESUNDS BRUK) 25 April 1977, see the whole document	1,3-7
A	--	2
X	FI, B, 42621 (IRMA DIMTER) 1 July 1968, see the whole document	1,3-7
A	--	2
X	DE, A, 1921006 (DIMTER, ERWIN) 26 November 1970, see the whole document	1,3-7
A	--	2
Y	DE, A, 1653018 (HOMBAK MASCHINENFABRIK KG) 2 September 1971, see the whole document	1,3-7
A	--	2

* Special categories of cited documents: [14]

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
6th February 1990	1990 -02- 0 9
International Searching Authority	**Signature of Authorized Officer**
SWEDISH PATENT OFFICE	Eddy Leopold

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)

Category *	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No
Y	DE, A, 2160257 (MARSTRAND, ANTON JULIUS, DIPL.-ING.) 6 July 1972, see the whole document	1,3-7
A	--	2
Y	DE, A, 2203010 (DIMTER, ERWIN) 26 July 1973, see the whole document.	1,3-7
A	--	2
Y	EP, A1, 0102806 (BOARDMAN, SUSAN MARY) 14 March 1984, see the whole document	1,3-7
A	--	2

ANNEX TO THE INTERNATIONAL SEARCH REPORT
ON INTERNATIONAL PATENT APPLICATION NO. PCT/FI 89/00202

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report.

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
SE-B- 392831	25/04/77	FR-A-B- 2321986	25/03/77
		DE-A-C- 2637524	10/03/77
		US-A- 4063579	20/12/77
		CA-A- 1060776	21/08/79
		AT-A- 364155	25/09/81
		SE-A- 7509438	26/02/77
FI-B- 42621	01/07/68	NONE	
DE-A- 1921006	26/11/70	NONE	
DE-A- 1653018	02/09/71	NONE	
DE-A- 2160257	06/07/72	US-A- 3790427	05/02/74
		SE-A-C- 381599	15/12/75
DE-A- 2203010	26/07/73	GB-A- 1376712	11/12/74
		JP-A- 49012011	02/02/74
EP-A1- 0102806	14/03/84	GB-A- 2125729	14/03/84